
Preface

In the early 1970s, after obtaining a degree in mathematical physics, I started working as a researcher in the Department of Reliability of the Saint Petersburg Elektropribor Institute. Founded in 1958, it was the first reliability department in the former Soviet Union. At first, for various reasons, I did not feel a strong inclination towards the topic. Everything changed when two books were placed on my desk: Barlow and Proschan (1965) and Gnedenko *et al.* (1964). On the one hand, they showed how mathematical methods could be applied to various reliability engineering problems; on the other hand, these books described reliability theory as an interesting field in applied mathematics/probability and statistics. And this was the turning point for me. I found myself interested—and still am after more than 30 years of working in this field.

This book is about reliability and reliability-related stochastics. It focuses on failure rate modelling in reliability analysis and other disciplines with similar settings. Various applications of risk analysis in engineering and biological systems are considered in the last three chapters. Although the emphasis is on the failure rate, one cannot describe this topic without considering other reliability measures. The mean remaining lifetime is the first in this list, and we pay considerable attention to describing and discussing its properties.

The presentation combines classical results and recent results of other authors with our research over the last 10 to 15 years. The recent excellent encyclopaedic books by Lai and Xie (2006) and Marshall and Olkin (2007) give a broad picture of the modern mathematical reliability theory and also present an up-to-date source of references. Along with the classical text by Barlow and Proschan (1975), the excellent textbook by Rausand and Hoyland (2004) and a mathematically oriented reliability monograph by Aven and Jensen (1999), these books can be considered as complementary or further reading. I hope that our text will be useful for reliability researchers and practitioners and to graduate students in reliability or applied probability.

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